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U. S. DEPARTMENT OF AGRICULTURE
WEATHER BUREAU
INSTRUMENT DIVISION

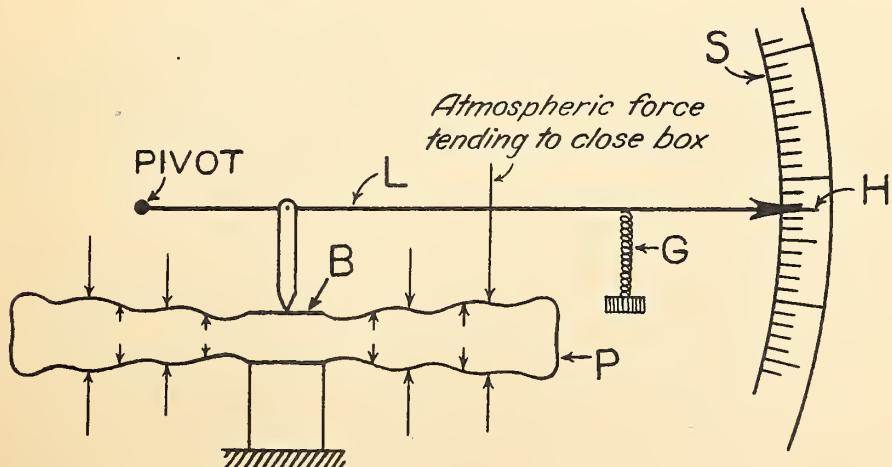
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Instructions for the Care and Use of
Weather Bureau Aneroid Barometers.

Purpose.- The purpose of these instructions is to inform the observer what precautions should be taken so that the pressure indications of the instrument will be of the greatest value. If precautions are taken, the aneroid barometer indicates the true pressure of the air without corrections to the readings.

Limitations.- The Weather Bureau has always relied upon mercurial barometers. Introduction of aneroids does not mean departure from this principle, but rather recognizes their value for some classes of observational work that do not involve permanent records. The specifications under which special grade aneroids are purchased aim at accuracy within 0.02 inches.

Principle of Operation.- The aneroid barometer consists essentially of a short cylindrical box or cell P, shown in the accompanying illustration, sealed air tight and exhausted. This box is caused to collapse by the external air pressure acting on the flexible upper and lower walls of the cell. When the pressure increases these surfaces approach each other slightly, when it decreases they move away from each other. To measure the change in atmospheric pressure, it is only necessary to measure the minute movement of the plate B at the center of the cell. The movement of this plate is amplified by means of the multiplying lever system L, which terminates in a hand H moving over the scale S. Thus the position of the plate B, which depends on the air pressure, may be determined. Backlash of the moving parts is taken up by means of the light spring G.





Tests by Instrument Division. - The instrument is first inspected for mechanical defects. All instruments are then tested for the accuracy of their pressure indications and the magnitude of the errors for slow changes of temperature. No instrument is released for use that requires corrections to be applied to its readings before the true pressure can be determined. Subsequent tests or adjustments should not ordinarily be necessary.

Unpacking the Instrument. - In unpacking the instrument care must be taken that it is not subjected to shocks or jars. It contains delicate and highly polished pivots and parts which will be seriously injured and scratched by such treatment.

Installation. - The barometer should be carefully hung up where the illumination on its face is good, but where it will not be subjected to vibrations, jars, nor extremes of temperature. Avoid partitions that have a slamming door, windows, heating systems, and direct sunshine. Visible oscillations of the hand make readings difficult and soon result in injury to the mechanism.

Position. - The barometer should always be hung up. Its indications are not trustworthy when it is lying down.

Reading of the Instrument. - The dial of the instrument is divided over the 360 degrees of arc in pressure units on a scale corresponding to inches of mercury. The smallest subdivisions are 0.02 inches of mercury. The scale can, therefore, be read to the nearest hundredth of an inch of mercury. The method of reading is as follows:

1. Before making a reading tap the barometer lightly with the finger or a pencil. This will minimize the effect of the friction of the bearings.

2. When making a reading be sure that the eyes are directly in front of the instrument dial in order to avoid reading the wrong position of the hand relative to the scale. This is especially important when the hand is located a distance from the dial.

Adjustment of the Instrument.-- Aneroids at times become inaccurate in their readings due to changes in the elastic properties of their cells with the lapse of time. The instrument is adjusted by very carefully turning a small screw which may be seen through the hole in the back of the instrument. Unless this adjustment is done with great skill the performance of the instrument as determined by the Instrument Division will be seriously changed. It is better to use an instrument which requires accurately known corrections to be applied to its readings than to try to adjust it to read correctly at one point of its scale, thereby introducing unknown errors at all other points. Instruments which have systematically changing corrections will be reported to the supervising official. Such performance of an aneroid barometer is generally due either to a very slow leak in the cell which it is impractical for the Instrument Division to detect in the time allowed for the inspection of the instrument, or to a leak which may have developed after the instrument has been in service. Such cases as these are rare in good grade instruments.

Never Oil Instrument.-- The relative movement between the parts of this instrument are very small, therefore, the consumption of oil is negligible. The instrument, therefore, does not require to be oiled. Most instruments are assembled without oil, which is left out because of its tendency to gum with time or to thicken at low temperatures.

Broken Cover Glasses.-- If the cover glass is broken the shock or jar has probably injured the instrument. Such an accident should be reported to the supervising official.

Washington, D.C., Sept. 12, 1931.
A.H.M/B.C.K.

B. C. Kadel.
Chief of Division.

